

**SPECIAL MAINTENANCE INSTRUCTION FOR FINDING JOINT LOCATION AND FLAW IN THE JOINT OF JOINTED GROOVED COPPER CONTACT WIRE**

1. **OBJECTIVE:** Condition monitoring of in-service “Jointed Grooved Copper Contact Wire”.
2. **BACKGROUND:** In 25kV a.c. Traction System, failures of silver brazed joints of Jointed Grooved Copper Contact Wire (hereinafter referred as JGCC wire) are being reported due to opening of silver brazed joint. Opening of silver brazed joint may be due to poor manufacturing technique, effect of sliding of Electric loco pantograph, corrosion due to industrial pollution and vibration fatigue and other internal defects during manufacturing stage.

Western Railway and Southern Railway have successfully done condition monitoring using ultrasonic scanning. Based on their experience and feedback from other railways following maintenance instructions are being issued.

3. **INSTRUCTIONS:** The most common technique for detection of cracks is ultrasonic scanning. Following are the equipment and operating guidelines for using on contact wire

- i. **Flaw detector:**

- a) It should be pulse echo type.
- b) It should be capable to carry out 100% scanning by accessing only bottom side of JGCC wire.
- c) Battery used shall be re-chargeable, plug-in type with approx. 8 hours continuous operation capacity per charge.

- ii. **Probe:**

- a) Angle beam probe of size 5 mm (diameter) should be used.
- b) Probe should have adjustable angle facility and frequency of 2.5MHz.
- c) Probe should have changeable wedge, which can be changed depending on the condition of JGCC wire.
- d) During scanning, angle of probe should be adjusted to 70<sup>0</sup>,
- e) Test Range: 0-100 mm,
- f) Reference Sensitivity amplitude: 70 dB, Scanning amplitude: +6dB.

- iii. **Scanning:**

- a) Scanning should be done on the bottom part of JGCC wire.
- b) JGCC wire should be applied with Couplant (refer probe manual) before scanning.
- c) Speed of scanning shall be suitable enough for greater efficiency.

- iv. **Maintenance:**

- a) The identified flawed/suspected locations found shall be marked by clip with red paint. It should preferably be spliced simultaneously using separate staff without affecting continuity of scanning.
- b) The jointed contact wire tension length shall be replaced with contact wire made out of CCC rod at earliest opportunity on programmed basis in the “identified polluted areas” and those tension lengths where contact wire tension has been increased.  
In other areas, failure prone JGCC wire may be replaced in phased manner.
- c) Maintenance depot shall keep a record in register of the tension lengths of JGCC wire in following format:

Section	Line	JGCC wire Tension length		Date of scanning	Indication % of FSH respect to RSL, location			Splice provided	JGCC Wire Tension length replaced	
		From	To		From	To	%		YES/ NO	YES/ NO

- v. **Periodicity of scanning:** Annual ultrasonic checking of balance JGCC wire. In addition, quarterly TW checking in identified high-polluted area.
4. Railways shall submit to RDSO the total length, no of tension lengths of JGCC wire in service, Replaced during last year.
  5. **REFERENCES:**
    1. Specification for hard drawn grooved contact wire(jointed/welded)-ETI/OHE/042(6/97)
    2. SMI no. TI/MI/0037 for OHE contact wire and associated fittings.